

## 'Frozen 2' Gives Homeopathic Quackery a Warm Embrace

Disney's film appears to support a debunked, but increasingly popular, form of alternative medicine.

By [Ariel Proccaccia](#)

December 24, 2019, 5:30 AM EST



No memory whatsoever. *Photographer: Christof Stache/AFP/Getty Images*

Like millions of other parents, I dutifully took my kids to see Disney's "Frozen 2" last month, thinking nothing of it. But a few weeks later, not only am I still humming "[Into the Unknown](#)," I am also pondering whether the company that created Donald Duck has embraced quack medicine.

Let me explain. The recurring theme in "Frozen 2" is that water has memory. This idea appears time and again throughout the movie, from the very first song – the haunting lullaby "[All Is Found](#)" ("where the Northwind meets the sea, there's a river full of memory") – to the predictably sentimental ending.

At first glance that doesn't seem unusual; after all, this is a movie whose main characters are an ice witch, a talking snowman and a guy who can basically read his reindeer's mind. What I found suspicious, however, is a scene where Olaf (the snowman) entertains his friends with scientific trivia: Water has memory, turtles breathe through their butts, men are six times more likely to be struck by lightning than women, and wombats poop in squares. These [claims](#) are reasonably accurate, [1](#) except for water memory. To make matters worse, Olaf actually [insists](#) that "it's disputed by many, but it's true."

Olaf's lecture seems to support homeopathy, a system of alternative medicine that relies on the idea that water "remembers" the effects of substances that were previously dissolved in it. In fact, homeopaths believe that the more the mother tincture – the original solution that contains active ingredients – is diluted in water, the more potent it becomes.

This counterintuitive principle of “less is more” is the source of the corny joke about the patient who forgot to take his homeopathic medicine and died of an overdose.

To give a concrete example, Whole Foods Market sells the homeopathic remedy Oscillococcinum for flu-like symptoms, [2] whose dilution factor is “200C.” This means that the mother tincture was diluted 200 times by a factor of 100, which gives a dilution factor of 10 raised to the power of 400 – that’s a 1 trailed by 400 zeros. Many accounts of homeopathy explain how extreme a dilution this is through colorful analogies, but that’s a futile exercise because the following fact is not in question: Oscillococcinum and similarly diluted homeopathic remedies are highly unlikely to contain a single molecule of their active ingredients.

The second major principle underlying homeopathy is “like cures like”: to cure a disease, use a substance that causes similar symptoms in a healthy person. Contact with poison ivy, for example, causes itching, burning and blistering; homeopaths believe it can cure herpes, eczema and arthritis – after being properly diluted, of course. Other substances used to make homeopathic remedies are much more disturbing, including Excrementum Caninum (dog’s excrement), Ambra Grisea (intestinal secretion of a sperm whale) and, notoriously, Murus Berlinens (pieces of the actual Berlin Wall).

The twin principles of homeopathy were formulated by its founder, the German physician Samuel Hahnemann, at the end of the 18th century. He discovered the principle of “like cures like” by consuming Cinchona, used to treat malaria, when he was healthy, and observing that it causes malaria-like symptoms. Today we have a precise understanding of the mechanism by which Cinchona combats malaria: It has nothing to do with Hahnemann’s ideas.

The origins of “less is more” are somewhat more mysterious. Hahnemann needed to dilute his remedies, as some were based on poisonous substances. He claimed that while dilution removed the remedy’s harmful side effects, it conveniently enhanced its healing potency.

If we are to accept homeopathy, then, we must also accept that Samuel Hahnemann discovered not one, but two fundamental laws of nature through wishful thinking. That’s not science – it’s prophecy.

It shouldn’t come as a surprise, therefore, that numerous attempts to rigorously test the efficacy of homeopathy haven’t been able to establish that homeopathic remedies are anything more than placebos. [3] In 2015, the Australian government’s National Health and Medical Research Council concluded that “there are no health conditions for which there is reliable evidence that homeopathy is effective.” A report released by the U.K.’s National Health Service in 2017 unequivocally concurs with the Australian council’s findings. Earlier this year, a joint report from France’s National Academy of Medicine and National Academy of Pharmacy reached the same conclusion, leading the French government to announce that it will stop reimbursing homeopathic treatments in 2021.

These studies assert that there is no evidence that homeopathy works, rather than stating that there’s evidence that it doesn’t work. That’s because it’s hard to prove a negative. That said, when a true medical breakthrough happens, the evidence for its efficacy is overwhelming. For example, Edward Jenner discovered vaccination in 1796, around the same time Hahnemann founded homeopathy. The response of the European medical establishment to Jenner’s radical idea was essentially “yep, nailed it”; within a few years vaccination was already saving countless lives.

Despite all of the above, homeopathy is still growing in popularity around the world. In the U.S., roughly five million adults and one million children used homeopathic remedies in 2012 – significantly more than in 2007. According to a 2007 report, the homeopathy market in India was growing at a rate of 25% per year, more than 100 million Indians relied exclusively on homeopathy for medical care, and the country had close to 250 thousand registered homeopaths. Recent surveys show that 77% of the French and 17% of Italians have taken homeopathic remedies.

The trouble is that many consumers of homeopathy are unaware of what they're really getting. It turns out that after learning what "200C" on the label of Oscillococtinum means, "fully half of [American] adults say they feel less favorable towards homeopathic over-the-counter drugs in general." That's why it's important to promote public awareness of the facts.

With "Frozen 2," Disney has done just the opposite, whether intentionally or unintentionally. Either way, the company has long been in the business of creating fantasy worlds, which are usually delightful and wondrous. But we can't afford to live in one.

- 1 Admittedly, Olaf also claims that people blink four million times a day, which (if we didn't sleep at all) would amount to blinking roughly 46 times per second.
- 2 One review on Amazon Prime Now says that Oscillococtinum "might be witchcraft" because the writer was diagnosed with the flu on Friday and was back to work on Monday. Indeed, how else to explain such a miracle?
- 3 Chapter 3 of the book "Treat or Treatment" by Singh and Ernst gives an informative and amusing, if somewhat outdated, account of clinical studies of homeopathy and meta analyses thereof.

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